

WHAT IS CLAIMED IS:

1. A process for separating metals from solid wastes comprising the steps of:
 providing a waste material containing metals and at least one glass forming substance;
 5 heating said waste material in a direct contact radiant heating device to at least the fusion temperature of said at least one glass forming substance, said waste material being heated for a time sufficient for substantially all of said at least one
 10 glass forming substance to melt and form a molten glass, said fusion temperature being sufficient to vaporize a portion of said metals; and
 separating said vaporized metals from said at least one glass forming substance.

2. A process as defined in claim 1, wherein said waste material is heated to at least 1,900°F.

3. A process as defined in claim 1, wherein said waste material is heated to a temperature from about 2,000°F to about 3,000°F.

4. A process as defined in claim 1, wherein, after said portion of said metals has been vaporized, said heated waste material comprises said molten glass and a residual non-glassy material, said process further comprising the step of separating said molten glass from said residual non-glassy material.

5. A process as defined in claim 4, wherein said molten glass is separated from said residual non-glassy material by gravimetric separation.

6. A process as defined in claim 1, wherein said vaporized metals form a particulate material contained in a gas that is separated from said waste material, and wherein said process further comprises the step of filtering said particulate material from said gas.

7. A process as defined in claim 1, further

comprising the step of adding at least one glass forming substance to said waste material prior to said heating step, said at least one glass forming substance comprising a metal oxide.

5 7. A process as defined in claim 1, wherein said waste material is heated in a reducing atmosphere in order to facilitate volatilization of said metals.

8. A process as defined in claim 1, wherein said direct contact radiant heating device comprises an electric arc furnace.

10. A process as defined in claim 1, wherein said vaporized metals comprise a material selected from the group consisting of lead, zinc and cadmium.

11. A process for separating metals from waste comprising the steps of:

providing a waste composition containing metals and at one glass forming material;

heating said waste composition in a reducing atmosphere to a temperature sufficient to cause a portion of said metals to vaporize, said vaporized metals being contained in a flue gas being emitted by said waste composition;

further heating said waste composition in a direct contact radiant heating device to at least the fusion temperature of said at least one glass forming material, said radiant heating device being configured to heat said waste composition for a time sufficient for substantially all of said at least one glass forming material to melt and form a molten glass, said waste composition comprising said molten glass and a residual non-glassy material; and

separating said molten glass from said residual non-glassy material.

12. A process as defined in claim 11, wherein said waste composition is heated to at least a

temperature of 2,000°F during said process.

20 13. A process as defined in claim 1, wherein
said waste composition is heated to a temperature of
from about 2,200°F to about 2,900°F during said
process. *10*

13 *14*. A process as defined in claim *11*, wherein
said molten glass is gravimetrically separated from
said non-glassy material. *10*

15 15. A process as defined in claim 11, further
comprising the step of filtering and recovering said
vaporized metals from said flue gas.

16 16. A process as defined in claim 15, wherein
said flue gas is filtered by being fed to a baghouse.

15 *17*. A process as defined in claim *11*, further
comprising the step of reducing said waste composition
into smaller particles prior to being heated. *15*

16 18. A process as defined in claim *17*, further
comprising the step of drying said waste composition
prior to heating said composition, said waste
composition containing less than about 10% by weight
moisture prior to being heated. *15*

17 19. A process as defined in claim *11*, wherein
said radiant heating device comprises an electric arc
furnace. *10*

18 20. A process as defined in claim 19, wherein
said electric arc furnace includes carbon electrodes
that contact said waste composition during said
heating steps, said carbon electrodes contributing to
said reducing atmosphere for facilitating
volatilization of said metals. *5*

21. A system for separating metals from a waste
composition and for producing a reusable glass
product, said system comprising:

a radiant heating device including at least
one heating element that is configured to directly

contact and heat a waste composition, said radiant heating device being capable of heating a waste composition to a temperature and for a time sufficient to volatilize at least a portion of any metals contained in said waste composition and to vitrify and form a molten glass from any glass forming materials contained in said waste composition; and

10 a filtering device in communication with said radiant heating device for receiving a flue gas being emitted by a waste composition contained in said heating device and for filtering any metallic components contained within said flue gas.

15 22. A system as defined in claim 21, further comprising a thermal oxidizer positioned between said radiant heating device and said filtering device, said thermal oxidizer for combusting any organic compounds contained within said flue gas.

5 23. A system as defined in claim 21, further comprising a grinding device for reducing the particle size of a waste composition being fed to said radiant heating device.